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Marine artillery is too heavy and lacks the mobility and flexibility to maintain momentum with supported light maneuver units. Artillery must match the mobility of maneuver in order to accomplish its mission. The Expeditionary Fire Support System with the M327 120mm rifled mortar needs to replace the M777 155mm towed howitzer system in direct support artillery battalions of the Marine Corps in order to increase mobility and bridge the growing gap between artillery and infantry. The bottom line is that mobility in the complex and hybrid nature of wars the United States finds itself in today trumps firepower. Simply stated, the Marine Corps can not afford to invest too much on heavy artillery systems that struggle to make it to the battlefield in time to be decisive. Marine artillery is hampered by a lack of light direct support artillery battalions. It struggles to maintain momentum with supported light maneuver units in high tempo expeditionary operations. Marine artillery needs to return to fielding both light direct support and medium to heavy general support artillery battalions to remain relevant in future operations called for in Marine Corps Vision and Strategy 2025

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MASTER OF MILITARY STUDIES

TITLE:

MOBILITY VERSES FIREPOWER: A CASE FOR REVIVING THE LIGHT DIRECT SUPPORT ARTILLERY BATTALION

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Executive Summary

Title: Mobility Verses Firepower: A Case For Reviving the Light Direct Support Artillery Battalion

Author: Major Bradley S. Pennella, United States Marine Corps

Thesis: The Marine Corps must return to fielding light artillery battalions in order to provide units capable of maintaining momentum with light infantry battalions.

Discussion: Marine artillery is too heavy and lacks the mobility and flexibility to maintain momentum with supported light maneuver units. Artillery must match the mobility of maneuver in order to accomplish its mission. The Expeditionary Fire Support System with the M327 120mm rifled mortar needs to replace the M777 155mm towed howitzer system in direct support artillery battalions of the Marine Corps in order to increase mobility and bridge the growing gap between artillery and infantry. The bottom line is that mobility in the complex and hybrid nature of wars the United States finds itself in today trumps firepower. Simply stated, the Marine Corps can not afford to invest too much on heavy artillery systems that struggle to make it to the battlefield in time to be decisive. In a static battlefield well known in advance, the M777 is an extremely capable and deceive weapon system. However, as being proven today on the battlefields in Afghanistan, the Marine Corps does not get to chose where to fight or what type of terrain the enemy chooses to fight on. Artillery must provide a more mobile direct support platform to ensure it is in position to support when needed. The United States Army is the land army of America. The United States Marine Corps is the expeditionary 911 force in readiness that has to be prepared to deploy at a moments notice to any point on the globe. Let the Army maintain the heavy artillery punch needed for a sustained large scale conventional fight and form the Marine Corps around a highly expeditionary lighter artillery force.

Conclusion: Marine artillery is hampered by a lack of light direct support artillery battalions. It struggles to maintain momentum with supported light maneuver units in high tempo expeditionary operations. Marine artillery needs to return to fielding both light direct support and medium to heavy general support artillery battalions to remain relevant in future operations called for in Marine Corps Vision and Strategy 2025.

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Introduction

The current structure and organization of Marine artillery units do not effectively and efficiently support the maneuver force. Marine artillery is too heavy and lacks the mobility and flexibility to maintain momentum with supported maneuver units. Currently Marine artillery consists of medium and heavy artillery battalions and lacks a light artillery battalion. "The mission of artillery is to furnish close and continuous fire support by neutralizing, destroying, or suppressing targets that threaten the success of the supported unit."[1] In the Marine Corps there is the motto, "mission first". With that in mind, those that develop the structure of artillery units must always remember that in order to provide the fires required of the maneuver force, artillery must be in position to fire. No matter how far a gun can shoot is irrelevant if it is still being transported to the battle. Artillery must match the mobility of maneuver in order to accomplish its mission. The Marine Corps must return to fielding light artillery battalions in order to provide units capable of maintaining momentum with light infantry battalions. The Expeditionary Fire Support System with the M327 120mm rifled mortar needs to replace the M777 155mm towed howitzer system in direct support artillery battalions of the Marine Corps in order to increase mobility and bridge the growing gap between artillery and infantry. This move would once again create light artillery battalions in the Marine Corps that have proven effective throughout the history of the Corps. The Marine Corps must reorganize artillery units to remain relevant as it transforms to the force envisioned in Marine Corps Strategy & Vision 2025 (MCSV 2025). MCSV 2025 clearly states the need for fires to be responsive, accurate, and expeditionary. "Recent combat has confirmed the need to improve the essential fires and maneuver capabilities of Marine ground forces, especially within complex urban terrain. Schemes of maneuver in future operations will often necessitate coordinated, precise fires from ground, air, and naval

surface fire support platforms. These fires must be available twenty-four hours a day, seven days a week under all weather conditions and they must be able to rapidly and precisely engage the fleeting opportunities often found in irregular warfare."[2]

Although the current ground based indirect fire systems have immense capability, the Marine Corps did not purchased the right numbers of systems and has not changed organizational structure to take advantage of the revolutionary capabilities inherent with the newly acquired weapon systems. A revolution in military affairs (RMA) is needed. An RMA is a quantum leap forward in capability usually brought on by changes in technology. Although the technology has arrived for an RMA in artillery, mindsets have not changed since before World War I on how artillery can best support maneuver units and as such the direct support artillery battalion of today closely resembles that of units operating on the battlefield since World War I. This paper will argue the need to completely overhaul the current structure of Marine artillery and to change the main weapon system of direct support artillery units to fully exploit the capabilities recently acquired in the 155mm M777 lightweight towed howitzer (M777), the 240mm High Mobility Multiple Rockets System (HIMARS), and the 120mm mortar Expeditionary Fire Support System (EFSS) called the "Triad" of fires. Marine Corps Strategy & Vision 2025 dictates that, "we will practice a self-disciplined approach to force design and development. These efforts will strike a balance between being heavy enough to sustain expeditionary warfare and light enough to facilitate rapid deployment. We will apply lessons learned from current operations to maintain an edge against ever-adapting opponents."[3] The balancing act in this paper will be to do just that, create a force that is not too heavy and not too light. The logical flow of this paper will begin with a brief history of artillery from the First World War to present times to give the reader an understanding of how the current structure and

concept of employment of today has changed little since World War I. A detailed dialogue on the current structure of Marine artillery will then set the baseline for readers to understand where recommended changes can be made. Finally, a discussion on how the current structure can be transformed to meet future requirements and a new artillery regimental structure developed that will ensure the Marine Corps maintains a distinct advantage over future adversaries to create the responsive, accurate, and expeditionary force called for in MCSV2025.

For the most part, Marine artillery throughout its history acquired larger caliber cannons (for more range and firepower), more equipment (such as radar, radios, and computers), and more personnel (to man the new equipment) until they became so large they could not effectively and efficiently support the maneuver forces. In 2000, "Upon assuming command, Gen James L. Jones, Commandant of the Marine Corps, announced that Marine artillery must be fixed. With that guidance, Headquarters Marine Corps and the artillery community have gone back to the future. They looked at the problem and came up with the concept that again provided the maneuver commander with the artillery fire support in depth. The fire support triad consists of an expeditionary fire support system (EFSS), lightweight (LW) towed howitzer, an expeditionary indirect fire general support weapon system (EIFGSWS)."[4] This triad became M777, EFSS, and HIMARS discussed earlier. Marine Corps artillery now operates with three weapons systems that could allow it to bring a balance in providing fire support to the supported commander. But with the exception of the EFSS, transportability has taken a back seat to range and firepower putting artillery in an unbalanced position. Marine Corps artillery has outgrown its ability to maintain momentum with maneuver. The EFSS has been a huge leap forward to put expeditionary back in to the vocabulary of artillerymen. However, the small token number of sixty-six systems procured has really not changed the overall transportability equation. The

majority of artillery units maintain the M777 as their main weapon system. The M777 replaced the aging M198, 155mm howitzer in the early twenty first century. The M777 (9840lbs[5]) is nearly half the weight of the M198 (15,935lbs[6]) , but the prime mover, Medium Tactical Vehicle Replacement (MTVR)(28,690 lbs[7]) is heavier than its predecessor the 5-ton M1923/25 series truck (10,000lbs[8]). The actual overall weight on the combined system weighs over 12,000 lbs more now than prior to the introduction of the M777. Buying a lighter howitzer with a heavier prime mover did not change how artillerymen were able to employ their main direct support weapon system. The general support units employ HIMARS which can only be transported by C-130 or larger aircraft or brought ashore by LCU or LCAC. Since 2000, Marine artillerymen have been excited by the acquisition of such new and capable weapons platforms, but artillery is not yet fixed. A new way of employing artillery must accompany the new technology acquired. The direct support artillery unit whether platoon through battalion must maintain momentum with maneuver. Mobility must trump firepower. No amount of large caliber cannons or rockets floating off shore in the opening stages of an amphibious or expeditionary assault will affect the outcome of a Marine squad pinned down against an enemy machinegun bunker 1,000 yards from their objective. The direct support artillery unit of today must become more expeditionary and more flexible to respond to ever changing environment of hybrid wars of the future. With the intent to create a more mobile direct support artillery unit, let us begin the journey with a brief history of artillery.

History of Artillery: The Infantry – Artillery Split

"The World War demonstrated the importance of Field Artillery. The majority of casualties were inflicted by the arm." Gen John J. Pershing

Artillery is commonly referred to as the "King of Battle". This stems from the destructive effects artillery has rained down upon enemy units since its inception. Artillery came in to its own during the nineteenth century. "In the 300 years before 1914, all artillery except siege guns was engaged in close support of infantry or cavalry. During that time artillery endeavoured (sp) to match the mobility of the supported arms and to make its firepower more effective."[9] During World War I, field artillery increased in caliber, range, and weight and a merger of field artillery with siege artillery took place. This was necessary to combat the trench warfare tactics that emerged. However, there were significant drawbacks to increasing the size and weight of artillery to counter trench warfare. Field artillery became less mobile and the destruction large caliber artillery imposed on the enemy trenches was so severe that it created obstacles in the form of craters that inhibited the advance of infantry units it was supposed to support. It also destroyed the very road networks that artillery would need to traverse in order to follow the infantry.

"The average caliber of field guns increased rapidly during the First World War... Before the First World War it was about 75mm, during the Second World War about 105mm, and today it is about 155mm."[10] New tactics of artillery employment also sprang up during World War I. "Indirect fire was the most important innovation in artillery practice for 300 years."[11] Although large siege weapons had been used in this manner before, the effects of their fire were not used in close support of maneuver. Throughout World War I this method evolved until there became a noticeable and distinct break between infantry and artillery units. Bruce Gudmunsson in is book "On Artillery" called this the great divorce. "The withdrawal of artillery to cover was widely resented by other arms, which still preferred guns to deploy amongst them."[12] While the first two years of trench warfare saw a huge expansion of the artillery establishments of all major

belligerents, this growth coincided with an increased separation-in outlook as well as in space-between the artillery and the infantry which it was supposed to cooperate."[13] The common phase uttered by most artillerymen is that artillery conquers and infantry occupies attributed to J. F. C. Fuller. This saying only adds to the separation. It is this very separation that this paper is founded on and will attempt to correct by creating artillery units that once again operate with infantry.

Although World War I demonstrated the absolute necessity for armies to maintain a healthy field artillery branch, the stagnation of trench warfare gave a false sense of the type and number of tubes needed to be effective. "To overcome the trenches that resulted from the superiority of firepower over mobility, Europeans increased the number of heavy artillery pieces (often siege and railway artillery) in relation to the number of light field guns."[14] Artillery units during World War I became independent of infantry for the first time. Firepower trumped maneuver. Large formations of heavy field artillery became the norm and as a result warfare evolved in to a stagnate state of attrition where the side with the most artillery caused the most casualties and over time emerged victorious. The merger of siege artillery with field artillery actually had a detrimental effect for armies. The artillery branch although rich with firepower lacked mobility that it would sorely need in the next world war.

The first Marine artillery regiment was formed at Camp Pendleton, Ca at the end of World War I. "...and for the first time a full regiment of artillery was organized within the Corps – the 11th Regiment on 3 January 1918."[15] Up until this point Marine artillery units were simply a part of an infantry unit who added small caliber shock at the right points during a battle to free up maneuver. By 1920 each Marine infantry brigade contained an artillery regiment. The 1920 table of organization for a battery in the 75mm Field Artillery Regiment listed four 75mm

pack howitzers. There were three firing batteries in the regiment. While the rest of world was creating massive artillery units to combat trench warfare, the Marine Corps needing to be expeditionary maintained small direct support artillery units that fought alongside their infantry brothers. World War II brought a new era to artillery.

The German blitzkrieg showed that maneuver can negate artillery to a lesser role. Large, cumbersome artillery units could not keep up with a highly mobile maneuver forces. Opposing artillery found it difficult to accurately locate and target these formations. The Armored units also were more resistant to the effects of artillery as their personnel were now protected. "During the seven decades following World War I technological advances revolutionized weapons, munitions, mobility, command, control, and communications, and target acquisition. These improvements gave the field artillery the ability to furnish effective close support with observed indirect fire, something that it had been unable to do during World War I"[16] World War II was a baptism by fire and a trial and error period for all parties. Each side continued to make changes to their field artillery to increase its effectiveness as technological advances created the opportunity. Artillery units were formed in to several types based on tactical missions.

There are four tactical missions of artillery: direct support, general support, reinforcing, and general-support reinforcing.[17] Direct support tactical missions required artillery units to provide fires to one supported maneuver element. If these provided fires were not enough the general support, reinforcing, or general support reinforcing fires could be called in. See MCWP 3-16.3 *Artillery Operations* for further explanation on tactical missions. The German military tried several different formations to validate the best method of employing field artillery units. For the most part, German infantry divisions were supported by artillery regiments. At one point

they experimented with attaching artillery battalions directly to infantry brigades. This did not work. "...it was clear that making field artillery battalions part of maneuver regiments raised a number of problems. First, it put the assault regimental commanders in the business of positioning and resupplying batteries, tasks that conflicted with their primary duty of leading from the front. Second, putting artillery battalions under command of the assault regiments unduly complicated the massing of fire."[18] It is for this reason when creating the new structure for Marine artillery further in the paper that artillery will stay closely connected to infantry units but not organic to them. The standard field artillery formation that evolved from World War II was a regiment of artillery supporting each infantry division and corps or higher level artillery units controlled by the main field armies. "The artillery of an (American) infantry division was to consist of four twelve-piece battalions, three of 105mm howitzers and one of 155mm howitzers. Corps artillery was formed by assembling independent battalions under floating group and brigade headquarters." [19] By the end of World War II, the 75mm pack howitzer was removed from the U.S. inventory as the small caliber could no longer provide the necessary range or destruction of enemy targets. The 105mm howitzer emerged as one of the best field artillery weapons on the battlefield. It was small enough to move rapidly on the battlefield yet packed enough punch to be deadly. However advances in armor protection and the need for increased range led the 155mm howitzer to the forefront during the Cold War.

The nature of the Cold War drove the U.S. to develop large artillery formations of self propelled howitzers and rocket launchers. Through the 1950s and 1970s the weight of the field artillery increased drastically. In order to defend against the Soviet empire, large, heavy armor formations were created that needed artillery with similar mobility and survivability. Rockets also became a main weapon of field artillery as advances in rocket design led to extreme accurate

ranges that cannon artillery could not compete against. During this time tactical nuclear warheads were created for both rockets and cannons. "Known as Atomic Annie, the gun fired the first atomic artillery shell on 25 May 1953... For the field artillery this opened a totally new era in firepower by demonstrating that the technology existed to make atomic projectiles for field cannon and provided the foundation for the tactical nuclear battlefield."[20] With the advent of the tactical nuclear warhead, the need to disperse became evident to all parties. As the maneuver forces dispersed on the battlefield, artillery was forced to parcel out its resources to provide coverage to all units. "It (Marine Corps) institutionalized the World War II practice of forming landing teams. A howitzer battalion along with other support elements was added to an infantry regiment to form a regimental landing team."[21] This practice can still be seen in Iraq and Afghanistan during Operations Enduring Freedom and Iraq Freedom. By 1962, the M-1128 series T/O showed a Marine division with a regiment of artillery of four artillery battalions. Three battalions of direct support artillery and one general support battalion. Each direct support artillery battalion consisted of three 105mm howitzer batteries, a 4.2" mortar battery and a headquarters battery.[22]

Although the armies of the world were continuing to increase the size and caliber of their cannons, The Marine Corps recognized the need to maintain the 105mm howitzer. The battalion and regimental landing teams needed artillery that could support amphibious operations. Heavy self-propelled howitzers were highly effective but extremely difficult to get ashore. The Marine Corps maintained a balance with light direct support battalions of 105mm howitzers along with heavier calibers in general support. The Marine division also contained a 155mm general support artillery battalion with three firing batteries of six 155mm cannons each to conduct general support and reinforcing fires. By 1975, FMFM 7-4, Artillery Operation Manual, showed

that each Marine division maintained an artillery regiment that consisted of three artillery battalions. Each battalion consisted of three 105mm direct support batteries and one general support 155mm battery. These units provided the division with organic ground based fire support. The Marine Corps also maintained a Field Artillery Group (FAG) that maintained 3 special support batteries that could reinforce divisions as needed. These batteries consisted of an 8" self propelled battery, 175mm self propelled battery, and a 155mm self propelled battery.[23] By 1978 the FAG was disbanded and the self propelled units were transferred to the artillery regiments. The 1981 version of FMFM 7-4 shows the artillery regiment consisted of three direct support artillery battalions and two general support battalions.[24] Throughout this time the Marine Corps tried to find the right mix of direct support and general support battalions. But one trend that continued was the ever increasing caliber and weight of the direct support artillery battalion.

"Although the possibility of fighting low- to mid-intensity conflicts existed during the 1970s, the Iranian Islamic fundamentalist revolution of 1979 and the Soviet invasion of Afghanistan that same year encouraged the United States to broaden its strategic interests again beyond a primary focus on Europe to a global perspective."[25] By the 1980's field artillery had been shaped by numerous wars such as the Korean War, Vietnam War, Arab Israelis War, and the Iraq-Iran War as well as the tactical nuclear threat. For the first time field artillery began to field smaller, lighter cannons instead of continuing on with the eternal search for larger weapons with greater range and firepower. Since the inception of the first cannons, militaries have steadily increased the size of cannons in a seemingly never ending quest for more range, more firepower, and more protection. However, in order to be more survivable and able to deploy anywhere in the world, militaries around the world created light artillery battalions. The NATO

countries used the tested 105mm howitzer as their baseline weapon system for light units. However, "Marine artillery gave up its expeditionary capability when the decision was made to completely transition from the 105mm howitzer direct support weapon to all M198 howitzers in the late 1970s. This was at a time when the Marine Corps was trying to answer the question, 'what's the Marine Corps Role?' The Marine Corps wanted to make sure it had a role against the Soviet threat in the NATO arena."[26] The British learned a valuable lesson during their brief war with Argentina in 1982. They had light artillery with their light infantry units which were able to be flown from ships by helicopter in time to support the infantry. "The Falklands campaign demonstrated the value of light artillery with strategic mobility and the need for helicopters to give tactical mobility on the battlefield. It showed, if ever there had been any doubt, that artillery may be undervalued in peacetime training, its fire is vital in war."[27] The larger caliber and armored field artillery pieces created to stop a Soviet advance across Europe would never have made it to the Falkland Islands. World War III never erupted and the U.S. found that it's large, mostly armored forces were hard to deploy and not ideally suited for the lesser conflicts such as fighting counterinsurgencies. Although the Marine Corps decided to remove the 105mm from the inventory in the 1970s many commanders realized the capability light artillery possessed in mobility and the 105mm howitzer was maintained in excess for years after the decision. "After fielding an artillery force structure built upon the M198 the Marine Corps found itself confronted with artillery that provided a great deal more firepower, however, it was significantly heavier and larger. It also presented rather dramatic operational shortfalls in mobility that were not easily overcome." [28] From the late 1970s through the 1980s the Marine Corps consolidated all calibers and types of howitzers in to one platform, the M198 towed howitzer. By reducing to one platform the Marine Corps basically merged direct support and general support units in to one.

This merger truly destroyed the light direct support artillery unit. Marine artillery battalions no longer had an expeditionary lightweight 105mm howitzer. Due to limited mobility, units equipped with the M198 could no longer always be in position to support maneuver units. Marine artillery became a one size shoe to fit all contingencies. The realization that Marine artillery had lost its flexibility led to the commandant's declaration that artillery needed fixing in 2000.

The Direct Support Problem

The purchase of the EFSS, M777, and HIMARS has finally allowed the Marine Corps to once again field light direct support and general support artillery units. The flexibility sought by creating the triad has not emerged because the Marine Corps did not change its basic equation on how to provide direct support artillery. It still maintains the 155mm towed howitzer as the core for its direct support artillery units. The Marine Corps failed to realize that direct support artillery units need to match the mobility of the support commander. It has mishandled the introduction of the 120mm rifled mortar. This weapon system should become the main direct support weapon of Marine artillery. The 155mm M777 howitzer should join the 240mm HIMARS rocket as a general support weapon. Instead the Marine Corps only acquired sixty EFSSs for its fleet artillery units. It bought a total of sixty-six systems and the remaining six systems are with the supporting establishment. Twenty-four systems fielded each to 10th and 11th Marines and twelve to 12th Marines.[29] The concept of employment is for M777 firing batteries needing EFSSs to draw the weapon systems from regimental stores and employ them instead of their M777 howitzers in only a few distinct missions such as supporting the vertical assault element of Ship to Objective Maneuver (STOM) scenario. As directed in the Capability

Development Document, the "EFSS will be the principle indirect fire support system for the vertical assault element of a STOM force – notionally an RLT (-) (Reinforced)."[30]

Wars today can spring up at moments notice on almost any continent without warning. The nature of war can range from high intensity conventional combat to lower intensity hybrid conflicts and even guerrilla warfare. The Marine Corps needs a force structure that is agile enough to strike the enemy in any type of conflict without the need for major reorganization that would be required for cannon units to trade howitzers for mortars. Marine Corps artillery has recently completed the purchase of the triad of fires: HIMARS, EFSS, and the M777 and the completion of the triad in 2009 caused many to declare that "fixing" artillery is complete. The Marine Corps finally had a mix of weapons systems that could provide a balance between firepower and mobility. Although technological advances in weapons systems have been made, concept of employment of artillery has changed little since the invention of indirect fire during World War I. Current firing batteries are large cumbersome units that require large amounts of logistics and a secure road network to traverse. The current organization of Marine artillery batteries do not allow for breaking the battery in to smaller more mobile platoons for any length of time. The complex and hybrid nature of future wars should make artillerymen pause to reflect on how they will fit in to the overall big picture. Wars today are complex problems. They follow nonlinear paths and cannot be easily controlled. Long gone are the Maginot Line and the linear approach to fighting battles where combatants understood the location of the forward line of troops and where the rear was located. It was a time when battalion and regimental artillery units could be slowly transported to battlefields in time for major operations. The deliberate and time consuming build-up of forces as seen in Kuwait during both the first Gulf War and Operation Iraqi Freedom will not always be possible. Marine Corps artillery can fight the three

block war and has proven so in the last seven years of fighting, but it has always been a hard start. Only after building infrastructure and moving the mountain of supplies to forward operating bases does artillery truly enter the fight in the current environments in Iraq and Afghanistan. And even then, artillery units are confined to road networks and forward operating bases for most operations.

It was a long hard fight by Marine artillerymen to get the money to modernize the artillery branch and keep these efforts going through the maze and bureaucracy of the Defense Acquisition process. It is understandable that there were trade offs along the way during the acquisition process. In the end, the Marine Corps received the three types of weapon systems needed to provide a depth of fires to the supported maneuver commander. However, simply adding systems to the inventory is not enough. The concept of operations to fully realize the capabilities inherent in these systems must be developed. The M777 howitzer entered service in 2005, the HIMARS in 2007 and the EFSS in 2009. The last time MCWP 3-16.1, Artillery Operations was updated was 29 May 2002. Since then we have been fighting in Iraq and Afghanistan for six years. We have developed sophisticated and capable GPS guided munitions and over the horizon communications. We have reached a point where advances in technology should be driving changes to the way we conduct ground based indirect fires. M777 howitzer batteries have the capability to operate almost autonomously even sending individual howitzers sections or platoons to support geographically separated maneuver units. Currently in Afghanistan, firing batteries have been broken down in to two gun platoons and operate independent of the battery headquarters. This was forced by the rugged terrain and the excessive distances between maneuver units. In 2002, when Task Force 58 opened Operation Enduring Freedom for the Marine Corps landing at Kandahar Airport in Afghanistan howitzers were not

employed. The M198, 155mm howitzer was too heavy and its ammunition required too much logistical effort to be useful and remained onboard the ship.

The triad has arrived at last and the Marine Corps artillery branch of 2010 is revolutionary and full of promise ready to transform as directed by the Marine Corps Strategy & Vision 2025. Now is the time for artillerymen around the Corps to experiment with new tactics, techniques, and procedures to identify the strengths and weaknesses of these new technologies. The world of acquisitions is a long and arduous path, one that takes decades to traverse. We must continually focus our eyes to the future to ensure we remain relevant. The bottom line is maneuver must be supported with the most flexible, expeditionary, and lethal fire support. Artillery must cut the fat. Cut out all the absolutely non essential equipment and personnel. The Marine Corps needs to develop a lighter direct support artillery unit that has the ability to truly maintain momentum with maneuver. The general support artillery units can maintain the firepower and range necessary to defeat adversaries in large conventional fights while the direct support artillery units maintain the expeditionary nature required to get to the fight alongside their infantry brothers and not behind them. The central theme revisited will be to create a balanced force specifically focusing on making direct support artillery units smaller and more agile by employing the EFSS as their prime weapon system. A review of the current artillery structure within the Marine Corps will serve as a starting point to understand where changes can be made and how those changes will affect the current structure.

Current Table of Organization of Marine Corps Artillery Units

The current approved structure for Marine Corps artillery is four artillery regiments one to support each of the four infantry divisions of the Marine Corps. No artillery regiment is the

same and each regiment is unique in the number and type of weapon systems employed. The main weapon system of Marine Corps artillery is the M777 towed howitzer and most battalions employ this weapon system. Each battalion rates three firing batteries although many currently employ four batteries and each battery operates with six M777 howitzers. The Marine Corps has established two HIMARS battalions and is fielding only 60 total EFSSs to the operating forces. The M777 howitzer battalions are considered the direct support artillery battalions. The HIMARS battalions are considered the general support artillery battalions for the entire Marine Corps and are not specifically aligned to any one infantry division.

The Marine Corps today has a total of three active duty artillery regiments (10th, 11th and 12th Marines) and one reserve artillery regiment (14th Marines). There is no higher artillery organization than regiment. 11th Marines supports 1st Marine Division at Camp Pendleton, Ca. It consists of four artillery battalions: 1/11, 2/11, 3/11, and 5/11. The first three are 155mm M777 towed howitzer battalions and 5/11 is a HIMARS battalion. 10th Marines supports 2nd Marine Division at Camp Lejuene, NC and consists of: 1/10, 2/10, 3/10 and 5/10. All operate with the 155mm M777 towed howitzer. 12th Marines supports 3rd Marine Division out of Okinawa, Japan. It consists of only two battalions: 1/12 and 3/12. This regiment is severely under strength and maintains only one battalion with howitzers under its control (1/12). 3/12 is a headquarters only with no organic firing batteries. The firing batteries created for 3/12 have been transferred to CONUS based units. It maintains operational control of firing batteries sent by CONUS based units to Okinawa as part of the Unit Deployment Program. 14th Marines supports 4th Marine Division out of Fort Worth, Texas and is the only reserve artillery regiment and consists of 2/14, 3/14, and 5/14. 2/14 is a HIMARs battalion and the remaining two battalions are supplied with the M777 howitzer.[31] There are no organic 120mm EFSS units in

the Marine Corps. Instead M777 firing batteries are trained on the system and can replace their 155mm cannons for the 120mm mortar systems depending on the mission. "Within the artillery regiment, the artillery battery will man the EFSS. Eventually, the artillery battalion will man the EFSS and be capable of supporting and RLT in support of a STOM-scenario. These same batteries and battalions will have the M777E1 as their prime weapon system and the EFSS will be an additive capability that will reestablish the concept of a dual-caliber firing battery."[32] There are not enough EFSSs for all the firing batteries to transition at the same time. The 120mm EFSS is not currently envisioned to replace the 155mm M777 howitzer, but merely to provide fires in the gap created when conducting Ship to Objective Maneuver (STOM). This gap is intended to be closed as soon as M777 howitzers have arrived to relieve the EFSS equipped units. When conducting an assault using the STOM concept, artillery would fly in with the vertical assault element using the MV-22 Osprey. Once the logistic train catches up with the maneuver element, artillery would trade out their EFSSs for the longer range and higher caliber M777 howitzers. Therefore cannons and rockets are the main stay of Marine artillery and the mortar is used in special purpose missions requiring extreme mobility.

The Marine Corps currently has 27 active infantry battalions and 9 reserve infantry battalions. This is mentioned to get an appreciation for how the artillery regiments provide fire support to their maneuver brethren. As mentioned previously there are four artillery regiments in the Marine Corps and 13 artillery battalion headquarters. But also as mentioned due to fiscal and manpower constraints there are some paper units that do not have cannons or rockets. Therefore a study of actual firing batteries would give a clearer picture of the number of maneuver units that can be supported by the artillery. Table 1 below shows a breakdown by regiment of the types of artillery weapon systems owned by each regiment.

Table 1

Type of battery/Weapon	Number of Firing Batteries in 10th Marines	Number of Firing Batteries in 11th Marines	Number of Firing Batteries in 12th Marines	Number of Firing Batteries in 14th Marines	Total
155mm M777 Towed Howitzer	14	12	4	8	38
HIMARS	0	3	0	3	6
EFSS *M777 batteries give up howitzers when used	4	4	2	0	10

Since there are 36 infantry battalions in the Marine Corps logic would argue that there is only a need for 36 close support artillery batteries for an infantry battalion is doctrinally supported by one firing battery. Each infantry regiment is supported by an artillery battalion and each infantry division is supported by an artillery regiment. This system was developed over the ages and has proven extremely effective and responsive to the needs of the supported commander. It would be a mistake to stop at only looking at infantry battalions because our tank, light armored reconnaissance as well as our reconnaissance battalion brethren may want to argue for their own direct close support artillery firing battery. Each Marine Division has one tank battalion, one LAR battalion, and one Recon Bn. Once again, 3rd Marine Division is lacking in a full compliment of forces and only has a small recon battalion. Therefore if we look at just three divisions (1st, 2nd, and 4th) this would create a requirement for a total of 45 maneuver units in the Marine Corps leaving us short seven firing batteries. But a solid argument can be made for the general support HIMARS firing batteries to fill the gap with the independent battalions within the division. Usually tanks do not fight alone and are part of a combined arms team with an infantry regiment at the core. This infantry regiment would bring its own close supporting artillery to the fight. Also LAR and Recon Bn operate at such long ranges and

outside the normal AO of infantry units that cannon artillery would rarely be in position to support. This leaves the HIMAR firing batteries to provide the long range fires for these independent units. As we look to make changes in the current structure the premise will be that there is currently a need for the Marine Corps to provide thirty-six direct support artillery batteries to support the thirty-six infantry battalions of the Marine Corps. After reorganizing Marine artillery around thirty-six direct support firing batteries, savings in manpower and equipment will allow for an increase in general support firing batteries that can assist in providing Tanks, LAR, and Recon battalions fires as well reinforce the direct support batteries as needed and will be discussed in the following section.

Recommended Changes to Table of Organization

My central argument for reorganizing Marine artillery regiments is to create direct support artillery battalions that once again can maintain momentum with the supported maneuver force such as when the Marine Corps employed the 75 mm pack howitzer and the 105mm howitzer in its past. The new concept requires reorganizing Marine artillery battalions to have EFSS pure direct support firing batteries as well as a M777 pure general support battery within each direct support battalion. The first step will be to establish the 120mm rifled mortar as the direct support weapon for Marine artillery. Never again will an operational commander be required to leave artillery on ship as in Operation Enduring Freedom during 2002.

Creating the structure required to make this work will be no small effort on the part of artillerymen through the Corps. However, it is possible within the current structure allocated to the artillery community. EFSS firing batteries require less personnel and equipment than M777 equipped firing batteries. Therefore as M777 batteries transition to EFSS firing batteries there

will be manpower savings that will allow each current cannon battalion to maintain one six gun M777 battery. A current 155mm M777 firing battery consists of 146 personnel with six firing sections. Each firing section consist of ten Marines, nine 0811 cannon crewmen and one 3531 MTVR truck driver.[33] The remaining Marines operate in the fire direction center, ammunition section, communication section, maintenance and motor transport section and liaison sections. For the most part these sections would have to remain relatively the same size even after transitioning to the EFSS although each section could be paired down. Currently Marine Corps Systems Command is instructing units that 50 Marines are needed for operating the EFSS as a battery system. A M327 Mortar section requires only four 0811s to operate. 0811s can also serve as the drivers for the internally transportable Vehicles (ITV) used to transport the mortar tube and the ammunition trailer. Therefore for each M777 section converted to the M327 Mortar six Marines are freed up to be used for a general support firing battery.

The ideal direct support artillery battalion would consist of four firing batteries of EFSS and one six-gun firing battery of M777. Currently most artillery battalions have four firing batteries. Converting the four firing batteries to EFSS would create enough excess 0811s to create a fifth general support battery of six M777 howitzers. Although manpower would have to restructure many grades and MOSs for the final plan to include converting some 0811 MOSs to other needed MOSs, the new firing battery would require less officers, staff non-commissioned officers, and Marines because no liaison section is needed for a general support battery. This battery could also operate in close proximity to headquarters battery to leverage their maintenance and logistical resources. By creating a general support M777 firing battery in each artillery battalion, each artillery battalion would have the ability to weight the supported infantry

regiments main effort while at the same time ensuring the other maneuver elements maintained their own direct support EFSS units.

Using 1st Marine Regiment and 1st Battalion 11th Marines as an example will help bring this idea to light. 1st Marines is an infantry regiment and the higher headquarters of 1st, 2nd, and 3rd Battalions as well as 1st Battalion 4th Marines. 1st Battalion 11th Marines is the artillery battalion that habitually supports 1st Marines. It is the higher headquarters of A, B, and C battery 11th Marines as well as I Battery 3rd Battalion 12th Marines. 1/11 has four firing batteries to support four maneuver battalions. There is little room for the regimental maneuver commander to weight his main effort with indirect fires without robbing a supporting element of his direct support artillery. Converting the four firing batteries to EFSS equipped units would free up a total of 144 Marines. These Marines could then be used to create a fifth general support M777 firing battery within each artillery battalion. This general support artillery battery of six M777 howitzers would provide the punch needed to weight the main effort when needed. Many diehard artillerymen would argue that the loss in firepower and range would be unacceptable. However, the effective casualty radius of a 120mm rifled mortar is 45 meters compared to 50 meters for the 155mm howitzer. The range issue is still a problem, but Marine Corps Systems Command is currently heavily invested and working hard to correct the limited 8,000 meter range of the current EFSS ammunition. 13km Rocket assisted projectiles and 17km precision guided munitions are under development.[34] The vastly more mobile EFSS can displace faster than the M777 as well as provide a smaller footprint for enemy units to locate. Their ability to match maneuver speeds on the battlefield will keep them in the position needed to support maneuver. When range becomes too much of an issue, the general support M777 artillery battery or HIMARS battalion can fill the gap.

Conclusion

The bottom line is that mobility in the complex and hybrid nature of wars the United States finds itself in today trumps firepower. Simply stated, the Marine Corps can not afford to invest too much on heavy artillery systems that struggle to make it to the battlefield in time to be decisive. In a static battlefield well known in advance, the M777 is an extremely capable and deceive weapon system. However, as being proven today on the battlefields in Afghanistan, the Marine Corps does not get to chose where to fight or what type of terrain the enemy chooses to fight on. Artillery must provide a more mobile direct support platform to ensure it is position to support when the time has come. The United States Army is the land army of America. The United States Marine Corps is the expeditionary 911 force in readiness that has to be prepared to deploy at a moments notice to any point on the globe. Let the Army maintain the heavy artillery punch needed for a sustained large scale conventional fight and form the Marine Corps around a highly expeditionary lighter force. The 155mm M777 howitzer has a substantially better range at 30Km with extended range munitions than the EFSS. However the weight of the cannon and of the prime mover (MTVR) puts severe limitations on how it can be employed. It is truly the workhorse of the Marine Corps today. However, in future conflicts will it be in the fight or stuck in transit somewhere? Is the weight and logistical tail too much for the lighter maneuver forces envisioned in Marine Corps Strategy & Vision 2025? Will future maneuver commanders choose to allow air to cover their need for fires? Precedence has been set by TF 58 in 2002. Gen Mattis, commander of TF 58 conducted the now famous STOM to Kandahar Airfield to take on the Taliban and chose to leave his howitzers behind and relied exclusively on air to provide his fires. Roll the calendar ahead seven years and now the Marine Corps has the Expeditionary Fire Support System (EFSS). When the Commandant of the Marine Corps said to fix fires in 2000,

the artillery community set out to do just that. They created the triad of fires discussed previously. The three systems currently in the Marine Corps inventory provide a level of firepower, accuracy, flexibility, and deployability not seen previously. Artillerymen around the Marine Corps today can truly give their supported commanders options in the employment of indirect fires. This in turn opens new and exciting avenues for commanders in developing their schemes of maneuver. With the suggested changes to equipment and structure, the artillery regiments will make this a reality. We need all three systems. The 120mm EFSS provides the mobility, the 155mm M777 howitzer provides the firepower, and the 240mm HIMARS brings the extended range expected by our maneuver brethren. However, we need all three systems in the proper balance to be effective and efficient at the delivery of fires. This balance must be created that brings mobility back to the forefront. Appointing the EFSS as the direct support weapon system will accomplish the mission. The Triad of fires is like a three legged stool. The three legs of the stool can refer to firepower, range, and mobility. For too long, artillerymen have concentrated on range and firepower to the detriment of mobility. The EFSS was a great step in the right direction to correct this deficiency. However, it was not purchased in the right quantities nor is it being employed correctly to level the stool. Artillerymen can not stand by as the rest of the Marine Corps transforms to a more expeditionary force. Mobility must drive the decision of future artillery commanders to ensure artillery is in position to be on time and on target.

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APPENDIX A: EFSS FACT SHEET

Description:

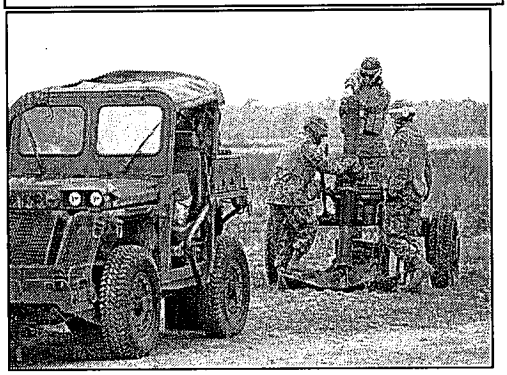
EFSS will be the direct support weapon system for the vertical assault element of the Ship to Objective Maneuver force. EFSS is defined as launcher, launcher prime mover, ammunition trailer and its prime mover, basic load of ammunition and crew, and will be manned by and supported by the Marine artillery regiment within the Marine division. As a critical element of the ground fires triad (HIMARS, M777E1 Lightweight 155mm towed howitzer and EFSS), EFSS will afford the MAGTF Commander increased flexibility in tailoring his fire support systems to support the scheme of maneuver. EFSS will provide increased speed, tactical agility, and vertical transportability to ranges that mirror that of a vertical force, with minimal tradeoffs in lethality. The EFSS shall be capable of 110 nautical mile lift internal to the MV-22 and CH-53E. EFSS began fielding at Camp Lejeune, NC in February 2009.

Characteristics:

Weapon Nomenclature: M327 120mm rifled mortar.
Vehicle Nomenclature: Internally Transportable Vehicle (ITV)
Number of vehicles in Battery: 12 prime movers (PM), 6 ammunition trailers, 6 mortar tubes, 5 Light Strike Variants (LSV).
Range of M327: 1200-8000m rifled ammunition 500- 6700m smooth bore ammunition.
Air Mobility: One PM and Mortar per MV-22/CH-53 Internal.
Effective Casualty Radius: 45m.
Rate of Fire: 2 rpm sustained/ 4 rpm max.
Emplacement time: 3 minutes.
Ammunition: HE, WP, ILLUM, and Army smooth bore 120mm ammunition.
Weights: M327: 1600 lbs PM: 3875 lbs LSV: 4750lbs

Source: PM FSS, Marine Corps Systems Command & ITV technical manual TM 2320-OR

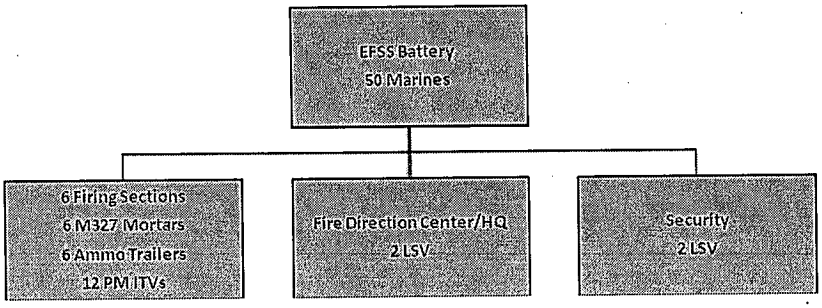
Prime Mover ITV with M327 Mortar



Prime Mover ITV with Ammo Trailer

LSV with mounted 50 Cal

PM w/ Ammo Trailer on MV-22



APPENDIX B: M777E1 FACT SHEET

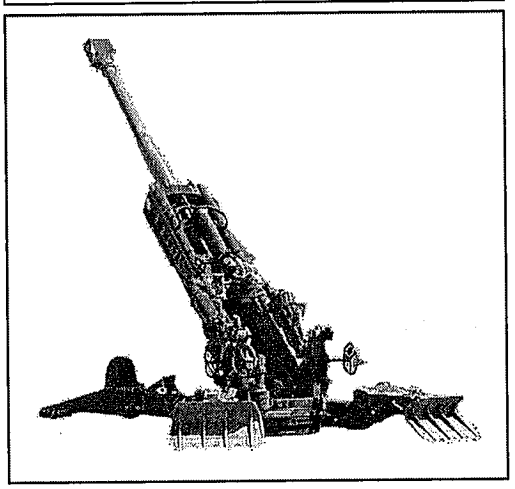
Description: The Lightweight 155mm Howitzer (M777) is the general support artillery for the Army's light forces. The LW 155 (M777's) lighter weight, smaller footprint, and lower profile increase strategic deployability, tactical mobility, and survivability. The use of titanium in its (LW 155) major structures makes it 7,000 pounds lighter than its predecessor (the M198) with no sacrifice in range, stability, accuracy, or durability. Two M777s can be transported by a C-130, and it can be dropped by parachute. The LW 155 (M777) is jointly managed, with the Marine Corps having led the development of the howitzer and the Army having led the development of Towed Artillery Digitization (TAD), the digital fire control system for the M777. The digital fire control-equipped howitzer is designated the M777A1. Software updates and the Platform Integration Kit (PIK) hardware gives the M777A2 the capability to fire the Excalibur precision guided munition. The specifications of the Excalibur-compatible LW 155 (M777) howitzer are: The Approved Acquisition Objective (AAO) = 511 units for the Marine Corps and 366 for the Army. The M777 is also in-service with Canada in Afghanistan.

Characteristics:

Weapon Nomenclature: M777 155mm towed howitzer
Weight: 10,000 pounds or lighter with TAD
Emplace: Less than three minutes
Displace: Two to three minutes
Maximum range: 30 km (assisted)
Rate-of-fire: Four to eight rounds per minute maximum; two rounds per minute sustained
Ground mobility: Family of Medium Tactical Vehicles, Medium Tactical Vehicle Replacement, five-ton trucks
Air mobility: Two per C-130; six per C-17; 12 per C-5; CH-53D/E; CH-47D; MV-22
155mm compatibility: all fielded and developing NATO munitions
Digital fire control: self-locating and pointing; digital and voice communications; self-contained power supply.
Effective Casualty Radius: 50m

Source: Information copied from M777 PEO Land Systems Website, Marine Corps Systems Command.

M777 155mm towed Howitzer

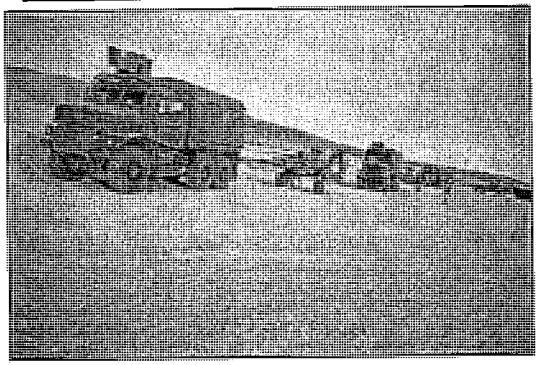


PM FSS, Marine Corps Systems Command

M777 Airlift by MV-22

Source: http://www.defenseindustrydaily.com/images/AIR_V-22_Underslung_M777_lg.jpg

MTVR Towing M777



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APPENDIX C: HIMARS FACT SHEET

Description:

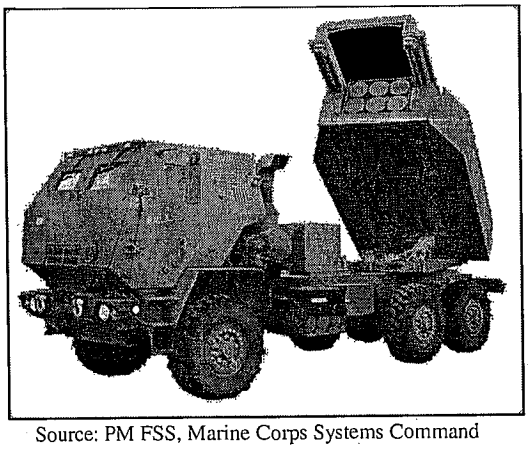
The High Mobility Artillery Rocket System (HIMARS) is a C-130-transportable, wheeled, indirect-fire, rocket/missile system capable of firing all rockets and missiles in the current and future Multiple Launch Rocket System Family of Munitions (MFOM). The HIMARS launcher consists of a fire control system, carrier (automotive platform), and launcher-loader module that will perform all operations necessary to complete a fire mission. The system is defined as one launcher, two re-supply vehicles, two re-supply trailers, and munitions.

Characteristics:

Weapon Nomenclature: M142 HIMARS
Caliber: 227-240mm rockets
Vehicle Nomenclature: Family of Tactical Vehicles (FMTV) for launcher and MTVR variant for ammunition resupply
Range of Rocket: 70 km (300+ with ATACMS)
Effective Casualty Radius: 300m
Ammunition: GMLRS, ATACMS, Unitary (HE and ICM)
USMC AAO: 46 (2 Bns x 18 launchers + 4 Supporting Establishment + 6 WRMR Forward)
Weights: HIMARS: 34,840 lbs RSV: 36,660 lbs RST: 20,100 lbs
Crew Size: 3 Marines
Rocket Load: 6 rockets, fired sequentially
Source: PM FSS, Marine Corps Systems Command

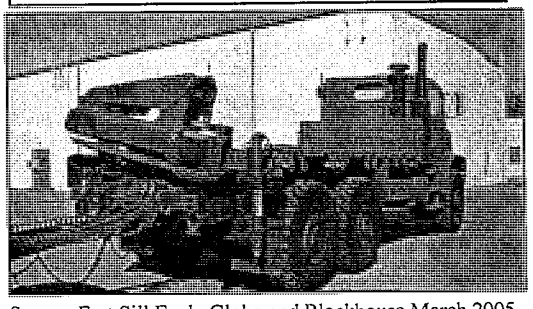
HIMARS Launcher

Source: PM FSS, Marine Corps Systems Command

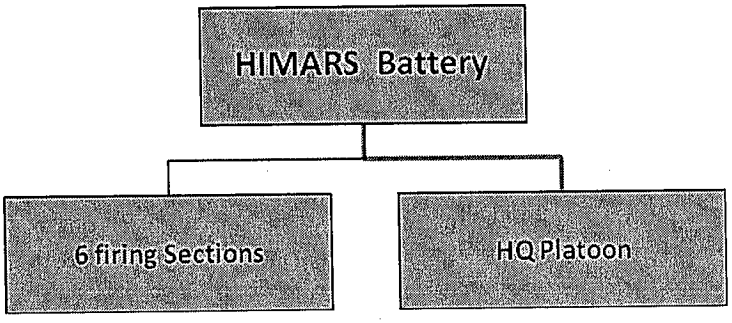


Source: PM FSS, Marine Corps Systems Command

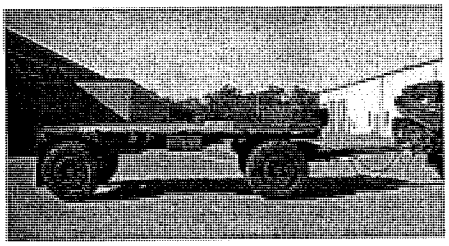
Ammunition Resupply Vehicle



Source: Fort Sill Eagle Globe and Blockhouse March 2005

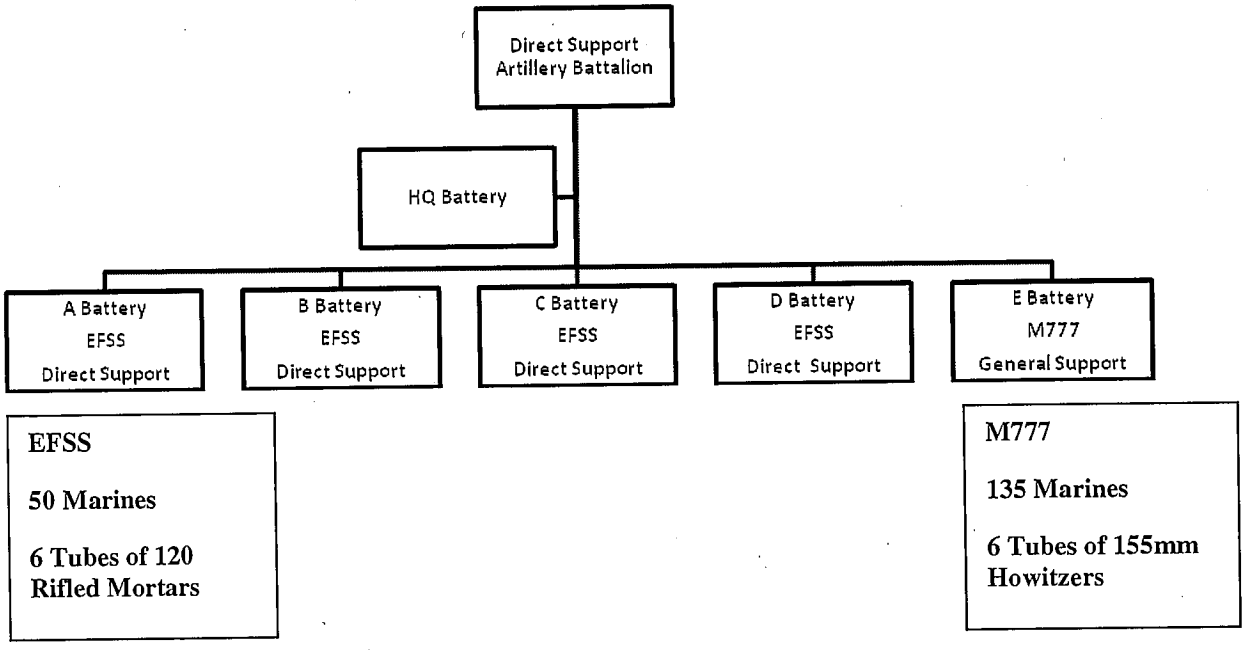


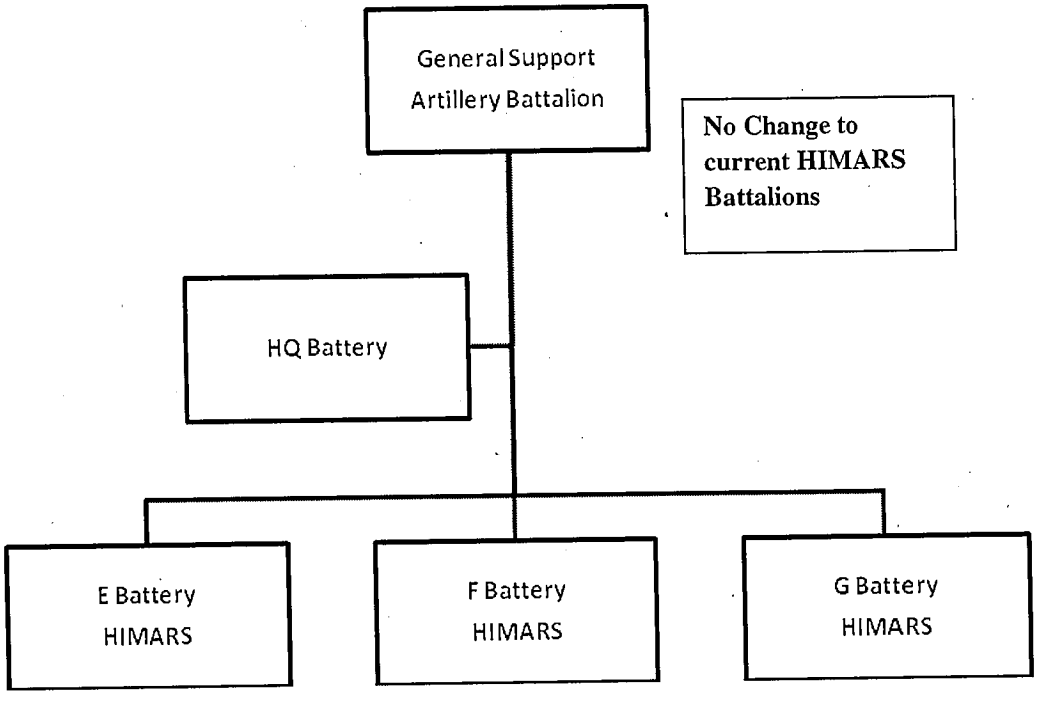
Ammunition Resupply Trailer



Source Fort Sill Eagle Globe and Blockhouse March 2005

APPENDIX D: RECOMMENDED NEW ARTILLERY TABLE OF ORGANIZATION





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